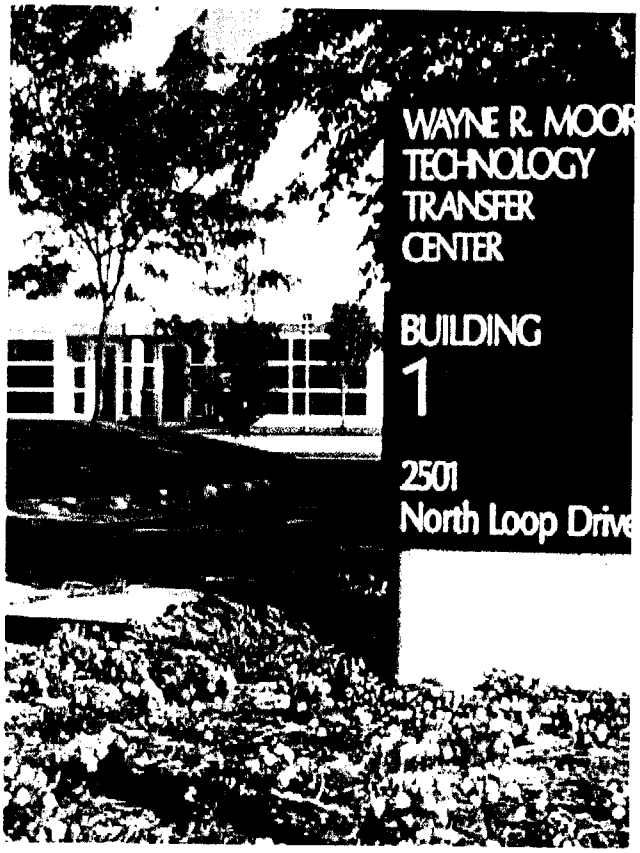
IOWA STATE UNIVERSITY

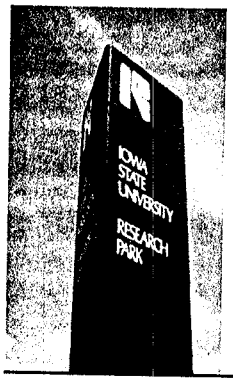
Building The New Economy



ISU Research Park
515.296.7275
www.isupark.org

ISU Business Development Center
515.296.7828
www.iabusnet.org

ISU Pappajohn Center for Entrepreneurship
515.296.6532
www.isupjcenter.org



IOWA STATE UNIVERSITY
Research Park

ENVIRONMENT

The Iowa State University Research Park plays a key role in the economic development activities of Iowa State University as it relates to technology transfer. It is part of a comprehensive innovation network. This network links technology creation, business formation, and development assistance with established technology firms and the marketplace.

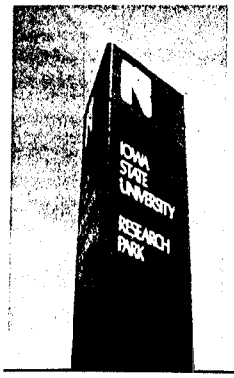
The ISU Research Park and its technology incubator provide a unique link to a premier research institution, Iowa State University. The Research Park's wet-lab facilities and their proximity to the university afford many advantages to biotechnology firms.

Modern Buildings:
300,000 Sq. Ft. Building Space
Laboratory Space:
58,000 Sq. Ft. Laboratory Space
Future Growth:
150 Acres

WET LAB SPACE

The ISU Research Park has a multi-tenant building that houses an 8,000 square foot wet-lab incubator facility. The incubation facility provides critically needed laboratory space for the growth and development of start-up, spin-off, and established biotechnology companies. Laboratory space may also be designed for a company's unique needs.

- Lab space available from 400 square feet up to 2,000 square feet, complete with fume hood, casework, sinks, eye washes, purified water, gas, vacuum, and air.
- Custom-designed labs available.
- Shared autoclave, centrifuge, freezer, tissue culture hoods, conferencing, and break room.



IOWA STATE UNIVERSITY
High Tech / Biotech

CONNECTIONS

The ISU Research Park is home to numerous technology companies, start-up companies, and university centers. The Research Park provides an innovative environment rich in resources to help entrepreneurs launch new and successful ventures.

Tenants located at the ISU Research Park have access to a variety of organizations and services both within the University and throughout the state. Companies may utilize incubator space, multi-tenant space, or may construct complete buildings located on the Research Park campus. The environment is one of peer support, networking opportunities, and a strong entrepreneurial culture.

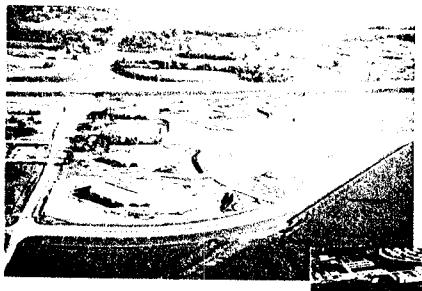
Tenants may utilize:

- Computer Laboratories
- Kitchen and Appliances
- Mail Services
- Internet Capability
- Conference & Meeting Rooms
- Audio/Visual Equipment
- Fax and Copy Machine Equipment
- Furniture Resources

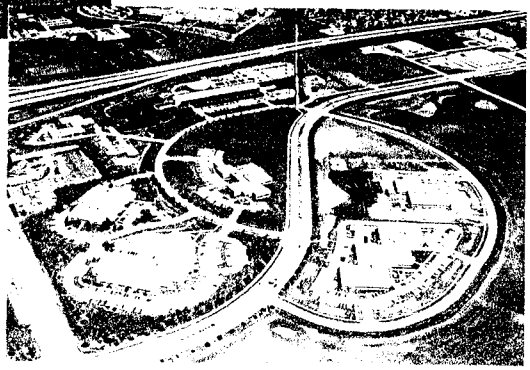
Tenants have access to:

- Chemical Supplies
- Research Services
- Campus Research Labs
- Environmental Health & Safety Services
- Hazardous Waste Disposal
- Radiation and Chemical Safety

SUCCESS



In just 13 years, the ISU Research Park has grown to be one of the most successful Research Parks in the Midwest. Over 120 companies and centers have located inthe ISU Research Park with over 45 currently operating at this location today. The ISU Research Park is proud to claim many "home grown" companies, with 80 percent of these companies having started in the ISU Incubator.

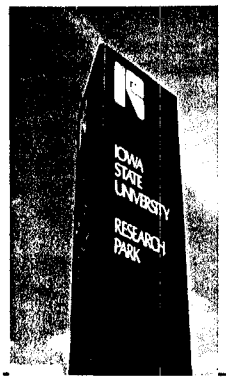


1990 (above)
50,000 sq ft
building space

2002 (right)
300,000 sq ft
building space

The ISU Research Park currently employs over 1,000 people, including many students who have landed in start-up companies after graduating from the university.

The Research Park currently houses 16 biotechnology companies employing over 700 people.



IOWA STATE UNIVERSITY
Entrepreneurial Services

Pappajohn Center for Entrepreneurship
Small Business Development Center

Located in the ISU Research Park, the ISU Pappajohn Center for Entrepreneurship, operating in partnership with the ISU Small Business Development Center, has a mission to enhance the entrepreneurial capacity and capability of ISU and the State of Iowa through education, programs and business assistance. The Iowa State University center focuses on the development and launch of technology based companies in the State of Iowa. The center offers programs and services at the university, local, and statewide levels.

BUSINESS DEVELOPMENT

The goal of the business development function is the creation of wealth through the formation of new companies and the expansion of existing ones. The highest priority is the establishment of companies that utilize technologies developed at Iowa State University. Through partnerships both within the University and throughout the state, the Pappajohn Center is a key entity in assisting companies to develop networks and resources for the successful and timely launch of new technology ventures. Through the Small Business Development Center, workshops and counseling services are available to assist both technology and non-technology companies.

EDUCATION & OUTREACH

ISU's unique multi-disciplinary Minor in Entrepreneurial Studies is available to all majors at the University, and currently there are over 100 entrepreneurial courses available to students enrolled at Iowa State University.

Students, faculty, and the entrepreneurial community have the opportunity to engage in a variety of programs and activities that foster and encourage the development of new companies and provide expertise and instruction in launching new businesses.

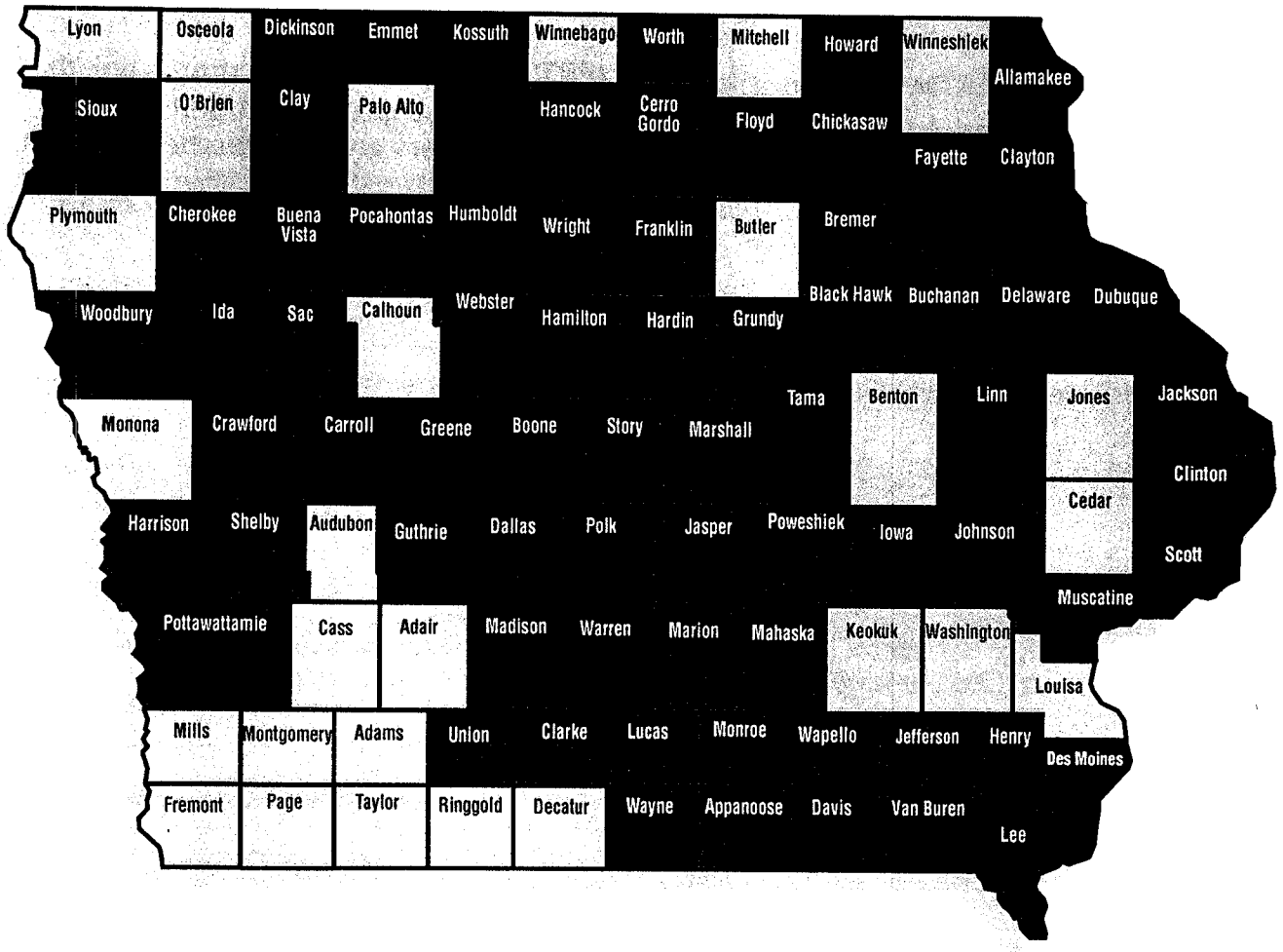
EXPERIENCE BASED LEARNING

The Center offers unique experience based learning opportunities for students through internships and business laboratories. Students work either directly for start-up companies in internships or in multi-disciplinary teams within business laboratories that perform valuable projects for early stage companies.

Over 75 students participate in these programs annually, and many find permanent employment opportunities waiting for them upon graduation.

Institute for Physical Research and Technology

IPRT WORKS for Iowa



Counties with IPRT interactions/assistance in 2002.

IOWA STATE UNIVERSITY

IOWA STATE UNIVERSITY

Institute for Physical Research and Technology

A network of research and outreach centers and programs that supports ISU's system for economic development.

The Mission of IPRT

- Promote world-class fundamental and applied interdisciplinary research in physical sciences and engineering.
- Foster the development of new technologies.
- Facilitate technology transfer.
- Provide technical assistance.

IPRT's Contribution to Iowa Economic Development (FY 98-02)

- 1,078 company-assistance projects
- 656 research projects
- 48 SBIR/STTR awards worth $10 million
- 12 company starts

IPRT Outreach Programs

IPRT's three outreach programs link the university research community to Iowa manufacturers and entrepreneurs, facilitating technology transfer and providing technical assistance.

- Iowa Companies Assistance Program
- Iowa Demonstration Laboratory for Nondestructive Evaluation
- Center for Advanced Technology Development

IPRT Research Centers

- Ames Laboratory of the U.S. Department of Energy
- Center for Advanced Technology Development
- Center for Catalysis
- Center for Nondestructive Evaluation
- Center for Physical and Computational Mathematics
- Center for Sustainable Environmental Technologies
- FAA Airworthiness Assurance Center of Excellence
- Materials Preparation Center
- Microanalytical Instrumentation Center
- Microelectronics Research Center
- Midwest Forensics Resource Center
- Virtual Reality Applications Center

FY02 Interactions

The Institute for Physical Research and Technology assisted over 240 companies and organizations in 71 Iowa counties. This assistance ranged from initial contact and referral to full research projects.

Adair
Schafer Systems, Inc.
Albia
Hawkeye Molding Engineers, Inc.
Albion
Donco Air Products, Inc.
Alta
Gull Wing Industries, Inc.
Altoona
Temputer, Inc.
Warren Frozen Foods, Inc.
Amana
Amana Refrigeration
Ames
3M Corp.
Advanced Analytical Technologies, Inc.
American Protein Corp.
Ames Police Dept.
Bright Engineering, Inc.
City of Ames
ColletJaws
CombiSep, Inc.
Ensoft, Inc.
ETREMA
Fox Engineering
Global VetLink
Howard Sales Co.
Innovative Materials Testing Technologies, Inc.
Iowa Energy Center
ISU Dept. of Public Safety
Metabolic Technologies, Inc.
Midwest Motorsports
Molecular Express, Inc.
NDE Technologies, Inc.
NewLink Genetics
Nisus Technologies
NovaScan Technologies, Inc.
Osteoceramics
Phytodyne, Inc.
Proplanner.NET
Sauer-Danfoss Inc.
U.S. Filter Corp.
Universal Harvester, Inc.
West Side Agates
WSI, Inc.
Ankeny
John Deere Des Moines Works
Techniplas Inc.

Bancroft
OnCore Systems Corp.
Belmond
Eaton Corp.
Bettendorf
Newell Riverside
Blairsburg
Chamness Technology

Bloomfield
Leprechaun Forge
Bonaparte
Riverside Plastics
Boone
Boone County Sheriff s Dept.
Boone Police Dept.
Boone Scenic Valley Railroad
Iowa Army National Guard
Iowa Thin Film Technologies, Inc.
Microlite Technologies, Inc.
Nitro Ice Cream
Oren Consulting Services
Bouton
Innovative Pallet, Inc.
Britt
Original Saw Co.
Burlington
Randolph Dental Instruments
Winegard Co.

Casey
Metal Technologies
Cedar Falls
Iowa Metal Spinners
University of Northern Iowa
Wayne Engineering Corp.
Cedar Rapids
Alliant Energy Co.
Bluestem Solid Waste Agency
Casco Products International
Computing Solutions, Inc.
Diamond V Mills
Genencor International, Inc.
IBM
Midwest Metal Products, Inc.
Physicians Clinic of Iowa
QualityCareSystems.Com, Inc.
Raining Rose, Inc.
Rockwell Collins
Centerville
Chariton Valley Resource, Conserv. & Dev. Corp.
Chariton
Astoria Industries of Iowa
Charles City
Diversified Fastening Systems
Diversified Manufacturing, Inc.
Floyd County Sheriff s Dept.
Cherokee
OBECO, Inc.

Clinton
Custom-Pak, Inc.
Equistar Chemicals
Clive
ecfirst.com
Iowa Pork Producers Association
National Pork Producers Council
Conrad
Green Products Co.
Ritchie Industries, Inc.
Coralville
Dunwoody Technology, Inc.
Rockwell Collins
Corydon
Shivvers, Inc.
Voltmaster Co., Inc.
Council Bluffs
ConAgra
Railings by Rau
Cresco
Howard County Sheriff s Dept.
Creston
Bunn-O-Matic Corp.

Dallas Center
Hy-Line Farm
Davenport
Abrahams Parts and Machine Service
ALCOA
Blue Wave Ultrasonics
Warren Packaging Corp.
De Witt
Wendling Quarries, Inc.
Des Moines
City of Des Moines Economic Dev.
Des Moines Water Works
EFCO
Helping Home
Iowa Air National Guard
Iowa Criminalistics Laboratory
Iowa Dept. of Public Safety
Iowa Division of Criminal Investigation
Iowa Law Enforcement Academy
Iowa Technology Center-Iowa National Guard
Kemin Industries, Inc.
National Resources Conservation Service-USDA
Principal Financial Group
Qwest Communications International, Inc.
Sciengistics
Townsend Engineering Co.
United Machine and Tool
Viable Technologies
Dubuque
John Deere Dubuque Works

Eddyville
Cargill, Inc.
Eldora
Hardin County Sheriff s Dept.
Eldridge
Olsen Engineering
Elkader
E-Ject Systems Engineering
Ellsworth
Casual Cuts
Ely
Kangaroo Recreation Co.
Estherville
Global Equipment and Mfg. Co.

Fairfield
Copperfield Chimney
Witherspoon Design
Fort Dodge
Advantage Agricultural Strategies, Inc.
Iowa Cooperative, Inc.
Fort Madison
Pipeline Cleaners, Inc.

Garner
Iowa Mold Tooling Co., Inc.
Grinnell
Ahrens Agricultural Industries
Creative Composites, Inc.
Grinnell Police Dept.
Guthrie Center
Guthrie County Hospital
Guttenberg
Kann Manufacturing Corp.

Hampton
Franklin County Sheriff s Dept.
Hampton Police Dept.
Harlan
Biomass Agri-Products
Insul-8 Corp.
Jacobs Corp.
Wilson Genetics
Hiawatha
FASTEK International, Ltd.
Holstein
VT Industries, Inc.
Humboldt
Dodgen Industries
Hy Capacity Eng. and Mfg.
Jet Company, Inc.
Syntex Industries, Inc.

Huxley
Huxley Police Dept.

Independence
East Iowa Plastics, Inc.
Indianola
Indianola Police Dept.
Iowa City
Access Now
Candleworks
Cellular Engineering Technologies, Inc.
Goldfinch Diagnostics
Patient Education Institute
Radix Corp.
University of Iowa
Iowa Falls
Iowa Falls Police Dept.

Jefferson
American Athletic, Inc.
Johnston
Pioneer Hi-Bred International, Inc.

Kellogg
Midwest Manufacturing Co.
Keokuk
Phoenix Manufacturing, Inc.
Keosauqua
Plaza Enterprises, Inc.
Knoxville
Knoxville Police Dept.

Laurens
Positech
Lisbon
Lloyd Table Co.

Madrid
Madrid Police Dept.
Manchester
Henderson Manufacturing
Maquoketa
Dynamic Metal Forming
Marshalltown
Dow Agrosciences, Inc.
Fisher Controls International, Inc.
Lennox Industries, Inc
Marshalltown Police Dept.
Mechdyne Corp.
Mason City
IMI Cornelius
Metalcraft, Inc.
Missouri Valley
Carry-On Trailer
Mount Pleasant
Heatilator, Inc.
Muscatine
Grain Processing Corp.
HON Industries, Inc.

Interactions (continued)

Nevada
ALMACO
Mid-America Manufacturing, Inc.
Nevada Metalworks, Inc.
Nevada Police Dept.
Story County Sheriff s Dept.
New Hampton
Chickasaw County Sheriff s Dept.
Newell
Newell Police Dept.
Newton
Jasper County Sheriff s Dept.
Maytag Corp.
North Liberty
Centro, Inc.
Viraquest
Northwood
Unimold

Oelwein
Heartland Resource Technologies
Osceola
Osceola Police Dept.
Oskaloosa
Kelderman Manufacturing, Inc.
Mahaska County Sheriff s Dept.
Oskaloosa Police Dept.
Ottumwa
Stone & Steel

Pella
Pella Corp.
Pella Engraving Co.
Precision Pulley & Idler
Vermeer Manufacturing
Postville
Industrial Laminates-Norplex, Inc.
Princeton
Johnson Manufacturing Co., Inc.

Rock Valley
Double H H Manufacturing

Sac City
Sunwise Systems Corp.
Sheffield
Sukup Manufacturing Co.
Sioux City
Prince Manufacturing
Rocklin Manufacturing Co.

Spencer
All Star Pro Golf, Inc.
Maurer Manufacturing, Inc.
Spencer Police Dept.
Spirit Lake
Pure Fishing
St. Charles
AEC Enterprises
Storm Lake
Buena Vista County Sheriff s Dept.
Sara Lee
Storm Lake Police Dept.
Story City
Story City Police Dept.

Templeton
PAQ-CELL, Inc.
Terril
Farmers Coop Elevator Co.
Toledo
Pioneer Hi-Bred International, Inc.
Tripoli
ESP

Union
Paragon International
Urbandale
Iowa Soybean Promotion Board

Waterloo
Deere & Co.-Product Engineering Center
John Deere Waterloo Works
O. M. J. C. Signal, Inc.
Webster City
Arrow Acme, Inc.
Electrolux Home Products
Hamilton County Sheriff s Dept.
Webster City Police Dept.
West Burlington
PortMidwest International
West Des Moines
Check-All Valves Manufacturing Co.
Heartland Fields
Iowa Corn Promotion Board
West Liberty
Engineered Rubber Products
Westside
Hugg Transport
Winterset
Hirsch Systems
Woodbine
Phyto Technologies, Inc.

IPRT WORKS for Iowa

Phytodyne, Inc., Ames

Phytodyne, Inc., a new biotech company created by two Iowa State University researchers, has received assistance from IPRT's Center for Advanced Technology Development on several fronts. The company develops novel genome modification technologies for plant sciences companies. Daniel Voytas, company president, said Phytodyne is an example of how the state's efforts are cultivating life sciences entrepreneurs.

Voytas, along with fellow Ph.D. scientist David Wright, developed their technology and created Phytodyne with initial funding provided through de-risking investments from CATD and others. CATD also helped the company obtain grants from the National Institutes of Health through the federal government's SBIR program. The company, which recently moved into new labs in the ISU Research Park, employs eight full-time scientists and has received venture capital backing.

PortMidwest International, Burlington

PortMidwest International is seeing a marked upswing in interest in its unique camouflage products for outdoors men and women, thanks in part to work done by IPRT's Iowa Companies Assistance Program. "We're getting unbelievable response now," said David Pittman, company president. "No one else has what we're doing."

Called the PMI Cover System, the product is made to resemble real branches and leaves. When a previous generation did not perform as desired, the company turned to ICAP for assistance. An ICAP scientist analyzed the types of wires used to manufacture the product and educated Pittman on the materials that could be used to improve the product.

The refined product, lighter and more formable, is helping PMI grow its business. Pittman said the service from ICAP was exemplary. "When we asked for things, they were very quick to respond. They were conscious of my needs and adapted to what I needed to work," he said. "ICAP can help a lot of people."

Centro, Inc., North Liberty

IPRT's Iowa Demonstration Laboratory is helping Centro, Inc. solve a tough quality assurance challenge. "They've done a really good analysis on our product. We're really happy about the results," said Rob Scott, a research and development engineer at Centro. The company believes that the technology, when implemented, will produce significant savings.

Centro is a leading manufacturer of rotationally molded plastic parts for industries ranging from agriculture to safety. One of its unique offerings is a hollow plastic part lined with foam. Because of the complex shape of such parts, the company came to IDL to see how its nondestructive evaluation expertise might be applied to evaluate the quality of the parts. IDL, with the help of Iowa State University undergraduate engineering research assistants, evaluated various nondestructive testing methods. None of the traditional and commercially available was found to work, but a feasible laboratory measurement system was developed. So, Centro joined with IPRT's Center for Advanced Technology Development to fund IDL to develop and deliver a fieldable prototype unit, an effort now underway. "It's great that IPRT was able to support us in making a prototype, because without that we wouldn't be able to implement the technology even though we know it exists," Scott said.

Valley Machining Co., Rock Valley

Valley Machining Co., a general machining job shop, turned to IPRT's Iowa Companies Assistance Program to help it reduce cost and improve quality of its rebar splices. "Changes made as a result of the testing and recommendations yielded improved process control," said Tony Rau, engineering manager. The effort was managed by the Iowa Manufacturing Extension Program, an IPRT partner.

The splices are used to join rebar in concrete construction. They require special bolts designed to break within a given torque range, ensuring that the correct torque is applied in the field. Some bolts were breaking above and below the specification. Valley Machining had a suspicion as to the cause, but turned to ICAP to scientifically confirm it. Working with the IMEP agent, an ICAP materials scientist evaluated the bolts and provided its findings to the company. With this information, Valley Machining was able to work with its material supplier to obtain bolts that performed as required. The overall strength of the splices was also tested in a lab at Iowa State University, an effort funded by ICAP.

All Star Pro Golf, Inc., Spencer

All Star Pro Golf, Inc. received assistance from IPRT's Iowa Companies Assistance Program to design its new line of aluminum-shaft golf clubs. The company purchased equipment and sought advice on material selection and processing of aluminum alloys. ICAP and IPRT's Ames Laboratory performed design calculations and tests to recommend materials and fabrication and heat treating methods. The company said it expects to have over $100,000 in sales and add 1.5 jobs.

Oren Consulting Services, Boone

IPRT's Center for Advanced Technology Development has helped Oren Consulting Services receive federal funding to test its innovative new product. The company received a $70,000 award from the U.S. Department of Agriculture to conduct a feasibility study for detecting the decay of in-

service wooden utility poles by a process known as "microtoughness" testing.

As a result of successful preliminary testing, the firm was contacted by the Iowa Department of Transportation, which is responsible for almost all of the 25,000 wooden bridges in the state. Based on the result of the testing, the Iowa DOT is adopting the firm's testing as a standard, has purchased a device for making test samples, and is working with the firm to rewrite bridge inspection protocols.

The project is another example of CATD's efforts to greatly improve Iowa's participation and success in the SBIR/STTR federal research funding programs, an important indicator of a state's competitiveness in tech-based economies. Oren company president Glenn Oren recently began sharing his successes with the SBIR program through a CATD-related mentoring program and is currently assisting a north central Iowan who is considering a proposal.

Indian Hills Community College, Ottumwa

The IPRT Research Seed-funding Program funds interdisciplinary projects for which preliminary work will lead to follow-on funding and that have potential to impact Iowa's economy. IPRT's Virtual Reality Applications Center led one such project, which developed tools for applying virtual environments to power plants.

The result of this seed funding is impacting the growing bioprocessing industry in southeast Iowa. Following the seed project, VRAC was able to partner with Indian Hills Community College and its Iowa BioDevelopment effort to garner a $250,000 grant from the National Science Foundation. The goal of this 3-year program is to develop a high-tech system for training operators of bioprocessing plants. Students trained at IHCC's Iowa Bioprocessing Training Center in Eddyville are sought after by companies at the neighboring Iowa Bioprocessing Center who partnered in the NSF project — Cargill, Ajinomoto USA, Ajinomoto Heartland and Wacher Biochem.

VRAC's contribution to the project is to design and build a portable "virtual reality" environment that provides an interactive, three-dimensional model of the fermentation process. This pioneering system will be used to train college students and industry employees and recruit high school students to the biotechnology field. Moreover, the system may eventually be used as an engineering tool to help design and refine fermentation equipment.

Equistar Chemicals, Clinton

The Equistar Clinton Complex makes polymer resins that are used to produce a variety of plastic products and other chemicals. Recently, the company came to IPRT's Iowa Demonstration Laboratory seeking a nondestructive evaluation method to economically inspect the miles of carbon pipe throughout the plant for corrosion damage, an important safety issue for the company.

A pulsed eddy current method that can inspect through the pipe insulation was pursued through the IDL's short-term, no-cost technical assistance to Iowa companies. The company believes that if this inspection technique is successful, it can reduce inspection costs by at least $200,000 annually. Moreover, the project became part of an integrated design course at Iowa State University, where undergraduates seek to advance solutions to real industry questions. The company is very pleased with the results during the Fall 2002 semester and additional questions will be further addressed by the next class.

IPRT FY02 Funds

State of Iowa Special Purpose Funds **4.1 M**

Center and Commercialization Project Support 3,206,200

Faculty and Graduate Assistant Salaries	975,300
Professional & Scientific Salaries	1,225,200
General Services Salaries	401,800
Hourly Wages	121,500
Materials, Supplies, & Services	310,100
Equipment	172,300

Industrial Outreach Program Support 852,200

Cost Share R&D
Iowa Demonstration Laboratory for NDE Applications (IDL)
Iowa Companies Assistance Program (ICAP)

	Cost Share R&D	IDL	ICAP
Faculty and Graduate Assistant Salaries	136,000		
Professional & Scientific Salaries	79,400	153,500	126,900
Hourly Wages	38,200	6,800	
Materials, Supplies, & Services	97,200	37,700	148,800
Equipment	16,300	9,400	2,200
Subtotal	366,900	207,400	277,900

Iowa State University Allocation **2.1 M**
(Salaries, Materials and Supplies, Equipment)

Private Industry Project Funds **2.8 M**

Federal Project Funds **39.4 M**

Department of Commerce	223,500
Department of Defense	1,253,500
Department of Energy	26,964,200
Department of Transportation	6,171,000
Health and Human Services	490,300
NASA	627,500
National Science Foundation	874,800
USDA	1,013,100
Various Federal Agencies	1,770,400

TOTAL **48.4 M**

IPRT was established in 1987 to pursue research and technology development in the physical and engineering sciences that lead to economic development with industrial involvement. This is accomplished through a variety of research, outreach and education activities and programs at the IPRT centers, linking the university research community to industry and government.

Contract Research Leverages State Investment —

A portion of the economic development appropriation is designated for research and development assistance and is used specifically to cost-share projects with Iowa companies. During the ten years of this program IPRT has leveraged every State of Iowa dollar in this program 4 to 1.

Year	Number of Projects[1]	State Cost Share Funds*[2]	Industry Funds*	Other Funds*	Totals*
2002	44	478.4	949.6	553.0	1,981.0
2001	34	329.5	691.6	604.0	1,625.1
2000	36	426.9	887.8	522.3	1,837.0
1993[3]	10	282.5	500.6	136.8	919.9
1993–2002	299	3,479.5	5,814.6	4,998.4	14,292.5
10-Year Average	30	347.9	581.4	500.0	1,429.3

* Dollars in thousands

1. At any point in time, CATD staff will be developing, implementing, or managing 25-30 projects. CATD's technology transfer associates work with Iowa industry to define research needs and match those needs with university and other state-wide research and development resources. The reported number reflects the number of discussions that end in contract research agreements with Iowa firms.

2. The figure in this column reflects the allowance of carryover funds from one fiscal year to the next and additional IPRT appropriation to CATD for contract research projects.

3. Initiating year, shown for reference.

For more information, contact:

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